SUPPLEMENT.

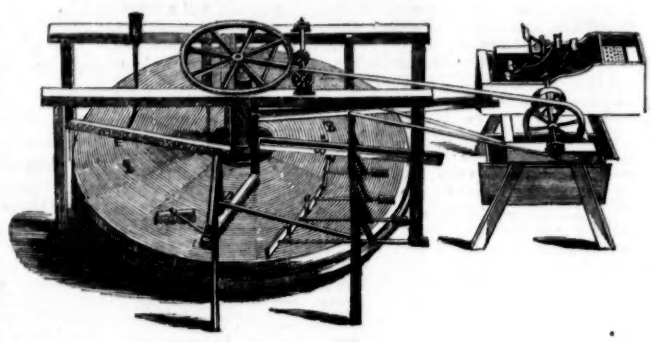
The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

No. 1128.—Vol. XXVII.] LONDON, SATURDAY, APRIL 4, 1857. [WITH JOURNAL.] Stamped ....Sixpence. Unstamped..Fivepence.

ZENNER'S PATENT ROTATING BUDDLE.



At the time of the introduction, from Hanover, of the Rotating Buddle, patented by Mr. David Zenner, of Newcastle-upon-Tyne, we published several communications from practical men in this country, which could not fail to prove the utility of the invention, and to bring its advantages more prominently before the public than any amount of advertising could have done. We may refer, as especially interesting, to the letters of Messrs. Darlington, Davey, and Thost, and of Capt. Eddy, who had seen the apparatus at work at Clausthal, and, having fully convinced himself of its superiority, had determined upon its adoption.

The first rotating buddle erected in this country was that at Driggith Mine, in Cumberland, of which Capt. Jeffrey, of Caldbeck (a Cornishman, and a thoroughly practical miner), is the principal owner, and although we had hoped to give a detailed description of the machine long ere this, circumstances beyond the control either of the patentee or of Capt. Jeffrey, whose frequent and protracted absence from the mine, upon inspecting and other business, was the cause of much delay, have prevented our doing so. The publication of the results has also been delayed from a few trifling alterations having been necessary, and, further, that the table works much better after a few weeks' wear, as the softer parts of the wood are then removed by the friction, allowing the harder fibres, or year-rings, to stand out and retain the particles of ore. In the meantime, however, we have published several letters upon the subject, and amongst them one from Capt. Jeffrey to the patentee, expressing his high opinion respecting it; and another from Capt. Jeffrey to Mr. J. H. Robinson, the secretary and purser of the Nether Hearth Mining Company, which was published in our Journal of March 21, stating that the rotating buddle would clean slimes, or ores *approaching* slimes, at *one-fourth the cost* incurred by the use of any other apparatus. The effect of Capt. Jeffrey's letter has been, that the directors of the Nether Hearth Mining Company have decided upon adopting the invention, and from it anticipate the most favourable results.

By reference to the illustration it will be seen that the buddle consists of a frame-work; an upright shaft, A, carrying a toothed wheel, which is moved by an endless screw, and by which motion is given to the rotating table, B B, attached to it. The slimes or ores to be washed are brought by means of a spout to a point near the centre of the table, where they are distributed in a broad and equal stream over it, thence they run down the surface; but, the inclination being ordinarily about 1 inch to the foot of radius it deposits its heavier particles on the table, whilst the lighter stuff is carried over the edge of the table into the circular receiving-box, R, and is usually quite free from ore. The table being and keeping steadily in motion carries the particles deposited upon it onward until the water issuing from the spout, S and W, distributing clear water over the surface of the table (where the slimes do not meet it) carries off a further part of the dead particles; in its onward course the action of the water is aided generally by brooms, rakes, or brushes, which agitate the ore, and allow the water to impinge freely upon it. The rakes, &c., are so hung by balance weights that they may be made to act with more or less force upon the slimes. All that remains upon the table after being exposed to the brooms, rakes, and brushes is clean and marketable ore, which requires only to be removed. This removal may be effected in two ways; firstly, by a set of brushes which move rapidly up and down the table, and thereby brush it off into the ore box—this arrangement is shown in the model exhibited, in the department of invention, at the Crystal Palace, Sydenham; or secondly, and which is preferable when possible, by suspending radially across the table a tube, E, perforated with two rows of small holes (1-30th of an inch diameter and ¼ inch apart) which project small jets of water against the table at an acute angle, and the cleaned ore is syringed off. The pressure for this is supplied by an upright supply pipe 8 ft. high, E—this arrangement is shown above, and also in the model forwarded to the Royal Polytechnic Society of Cornwall, Truro. The box on the right is a feed-box, into which the slimes from the pit are thrown upon a grate, and mixed to a proper consistency with water by means of stirrers—this may, however, be dispensed with where the slimes are received direct from the stamps.

The action of this apparatus, as compared with others now in general use, will be better understood, and its advantages more freely acknowledged when we state that the 16-feet rotating buddle has a working surface of about 200 square ft., of which each part has always a quantity of slime in course of treatment, and its cleaning is continued stage, by stage, in completing its circular course, and until it is pure ore, and then the apparatus itself removes it from the table; the separation of waste seconds and clean stuff is regular and perfect; and it is merely necessary, when once set to work, to keep it supplied.

The next apparatus as regards the quality of the work done is the common Cornish hand-frame; it produces ore of very good quality, but its area is only about 8½ ft. by 4 ft.=34 square ft., and it requires the attention of a person to run on the slimes, clear with water, rake or brush it up, and lastly to wash it off.

Brunton's machine has about the same working area as the Cornish hand-frame; the slimes run over about two-thirds of its length, and as, therefore, its course is shorter, more is carried away with the waste; the cleaning is only effected on the remaining one-third of its length, and the matters removed from the higher parts are mixed with those lower down; the result being that ore cannot be got quite clean. As to the quantity dressed, it may be estimated that the work done by Brunton's machine is about one-sixth that of the rotating buddle.

Lastly, and lowest in the scale, stands the common round buddle, the working area of which may be the same as the rotating buddle. This apparatus deposits the slime upon an inclined circular plane, and does not separate the ore at all; the separation being made *ad libitum* after a certain amount of slime has been deposited thereon, and under the most favourable circumstances the ordinary round buddle turns out much less ore, and that of considerably less purity.

It also leaves large quantities of ore, not only in the seconds, but also in the waste—this is not the case with the rotating buddle. Experiments carefully made abroad show that the amount of time required to clean a given quantity of slimes is 7·08 hours by the common round buddle, and one hour by the rotating buddle; or, in other words, that the latter does seven times the work of the former, whilst ore which has been operated upon by the round buddle is not nearly so clean as that turned out by the rotating buddle; this alone, even were the amount of work equal, would be sufficient to cause the rotating buddle to have the preference.

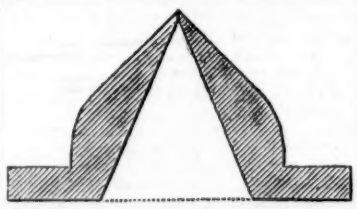
Although, perhaps, the first cost of the rotating buddle is somewhat higher than other apparatus, it would very speedily repay its cost, both from the saving of wages, and the greater produce extracted. The immense stride in the way of improvement which has been made in the introduction of this machine, may be compared with that taken by the introduction of the steam hammer as compared with the common forge hammer, or of the Cornish stamps as compared with the system of bucking by hand; it does more work in a given time at a cheaper rate, and better than by hand, or by any previous invention.

Another point of great importance is that of repairs. We find that at Clausthal the first rotating buddle was laid with ¾-in. boards, and lasted four years before they required relaying; and as the others were laid with stronger boards no other has yet required any repairs, nor do they appear likely to do so for some considerable time. The second, and more regular repair, was a new set of brushes for cleaning the pure ore off the table, which was necessary every 12 months. By the use of the syringe apparatus for this purpose, this latter cost of repair is entirely removed, and as it prevents the main friction against the boarding of the table the whole machine will last considerably longer, so that the expenditure for repairs may be estimated at the merest trifle.

It is an acknowledged fact that the Cornish miner looks with a jealous eye upon any invention introduced from the other side of the Channel, but with reference, at least, to the country from which the rotating buddle is imported, an entirely different feeling should prevail. It should be remembered that until the commencement of the reign of our present queen, Hanover formed part of the British empire, and that in no country are the miners more favourable to the adoption of English mining inventions; and, further, that it is an English resident to whom the mining community is indebted for the introduction of the rotating buddle. Many other inventions, which have proved of the greatest importance to mining, have been brought over from Germany, and for the benefit of mining, the Cornish miner should always consider that, whatever may be his jealousy with regard to the German miner, there is nothing to justify him in refusing the adoption of any invention, whether German or otherwise, by which a larger amount of profit may be secured to the mine adventurer.

Undoubtedly the Germans spend immense pains in their endeavour to advance science, and the majority of their mining captains are more highly educated than Cornishmen in the same capacity; but whether this has a favourable or unfavourable influence upon their capacities as practical miners is a subject upon which opinions are conflicting. We are, of course, inclined to believe that the Cornishman would turn out a much larger quantity of work than the German, but we should hesitate in asserting that more useful inventions are due to Cornwall than to Germany, as we feel certain that the reverse would be the fact. We would, therefore, advise the English miner to leave the German to invent, whilst the English are engaged in practical mining, whereby he will save far more time and money than would be paid for royalty upon the successful foreign inventions which are introduced.

India-rubber Pump-Valves.—We have this week inspected a pump furnished with Perreaux's patent India-rubber pump-valve, the action of which certainly surpasses anything which has previously been introduced. They are constructed entirely of India-rubber, vulcanised for the purpose and take the form of a tube, flattened at one extremity, approaching as nearly as possible, in form and action, the valves contained in the human heart. As will be seen by the annexed cross section of the valve, the thickness of the sides at the upper part diminishes gradually to the top, where the two sides meet, and form two lips, which, when the valve is in a state of rest, are in close contact, and prevent the downward passage of the fluid. With any upward pressure the lips freely separate, and allow of the upward passage of the fluid; whilst the gradual diminution in thickness towards the lips enables the valve to open and close with the slightest variation of pressure, and by properly proportioning to resist any required amount of downward pressure. The valve is extremely simple, and any substances which the suction of the pump is strong enough to raise will pass through the valves without in the slightest degree deranging them. Sand, grain, tow, rags, &c., pass through the pump, and as readily as the water itself, and however long the pump may have remained dry, it requires no priming with water to make it act. The valves work equally well in any position, vertical or horizontal, and the material of which they are made being vulcanised India-rubber, they resist the action of acids, alcalis, sea water, spirits, liquid manure, heat, cold, &c. From the construction of the valves, the current of water passes through in a direct line, instead of being turned in its course, as is the case with the ordinary valve; it, therefore, meets with no resistance whatever in its progress. It has been extensively adopted in France, and as soon as it becomes known in this country, its eminent utility must secure it the most complete success.



*** Tapping's Prize Essay on the Cost-Book System, enlarged and augmented, with Notes and an Appendix, can be had at the Mining Journal office, 26, Fleet-street.—Price 5s.

SOCIETY OF ARTS EXHIBITION.

Although most of the inventions on view at the Society of Arts are already, to some extent, known to the readers of the *Mining Journal*, the value of the Exhibition is not, in the smallest degree, diminished; since it affords an opportunity, to those interested, of seeing models from which they can form a more accurate idea of the applicability of an invention to the purposes for which they require it. The number of inventions immediately connected with mining is certainly limited; but, regarding the contrivances exhibited as specimens of what has been accomplished in the general advancement of science and industry, the result compared with the preceding collection appears very satisfactory.

The principal mining improvements are those of George Heppell, of Uttoxeter, for ventilating mines, and of J. H. Van Hengel, for preventing the fall of the cage, in the event of the rope breaking, while ascending or descending the shaft. Mr. Geo. Heppell proposes a furnace placed at surface within a shaft or chimney leading from the top of the upcast shaft, instead of at the bottom, as is usual. The chimney is to be of greater area, leaving a space from 12 to 18 in., open on three sides of the furnace, so that the air from the workings passing up the upcast shaft may come under and around the furnace, by which means the air is more rapidly circulated, and the power considerably increased. The furnace grate is to be not less than 50 ft. or 60 ft. area, except where the workings are limited. As auxiliary to this furnace, the inventor proposes a new plan of cage ventilation, in which the shafts are made air-tight, and the cages to fit. In the top of the cage is a circular disc valve, fitted with a balance weight; this valve, opening and shutting as the cage rises and falls, acts as an air-pump; and the valve arrangement being continued in the mine, the air cannot return to the downcast shaft. Mr. Van Hengel's invention consists of guide-rods, grooved racks, catches, and springs; but there appears nothing particularly new in the arrangement.

Connected with the Iron Manufacture, we noticed the diagram of a high speed direct-acting blowing-engine, by Mr. A. Slate, the framing of which consists of a single plain hollow cylinder, which carries everything. This is all the support the engine has, and it requires nothing more, as it is merely the dead weight of the parts which is to be supported. The blowing cylinder is carried by pillars on the top of the main hollow frame, and the driving steam-cylinder, which, like the blast-cylinder, is inverted, is disposed directly on the top of the main frame, and beneath the blast-cylinder. The piston of the latter has two rods, connected directly with the cross-head of the steam-piston, and a connecting rod from the latter passes down the crank-shaft, which has side rods for working the valves. A 40-in. engine, weighing 13 tons—the steam pressure used being from 50 to 70, and cutting off at one-third—gives a blast pressure of 2½ to 4 lbs., and blows 4500 cubic feet per minute.

Mr. Wm. Eassie, of the Railway Timber and Ironworks, Gloucester, exhibits a new arrangement of friction hammer, which, however, appears more complicated than needful, to produce the same effect. There appears no contrivance for regulating the force of the blow, as the hammer is entirely released from all control (except that the hammer rod passes between four guide pulleys, so that it may fall truly upon the anvil) previous to every blow. The chief feature in the invention is an oscillating frame, which carries the two friction rollers, by which the hammer is lifted; to one side of this frame is attached a weight, whereby the frame, being thrown out of the horizontal line, causes the rollers to grip the hammer rod. A chain connection admits of the movable frame being drawn into a horizontal position, and allows the hammer to fall, the friction rollers being then too far apart to interfere with the hammer rod.

Mr. J. Lee Stevens's (Fish-street-hill) regulating air-door for furnaces consists, as has been before stated in the *Mining Journal*, of an inner hemispherical compartment, an external door-plate, both perforated, and an intermediate adjusting plate, which is slotted. The adjusting plate can be fixed in any required position, by a handle and guide pin keeping the slots in the plate parallel with the perforations in the outer door.

Messrs. Fernihaugh and Farrow, of Dukinfield, exhibit their automaton contrivance for admitting the requisite quantity of atmospheric air into the furnace. In the furnace door is a series of valves, which overlap each other, and open and close in proportion to the heat of the furnace, whereby any attention on the part of the furnaceman is dispensed with.

An ingenious invention, by Wm. Lynn, assistant inspector of steam machinery, Portsmouth Dockyard, is shown. Its advantages are that all vessels will be enabled to carry spare screws, without taking up much valuable space, as these propellers are easily taken to pieces, and stowed in any portion of the hold, economising space and obviating the necessity for fixing the spare screw, as at present, upon the decks or over the hatchways, thereby relieving the ship of so much more additional top weight. The screw is so divided at the joint that the shank of each blade thoroughly encircles the centre pin. This is effected by one blade having a single male knuckle, whilst the other has a female joint of like form; a shoulder on the male fits into a recess on the female, and when both are accurately fitted, the eye is made to receive the screw spindle, or T headed shaft, which is secured by means of a feather or key fitted into it.

Messrs. Gwynne and Son, of Essex Wharf, Strand, have a model of their double-action centrifugal pump on view, and Mr. A. Parsey, of Scotland-yard, has also sent in his revolving pump, both of which inventions have long since been fully described in the *Mining Journal*.

Passing over several improvements in locomotive engines, we come to the coal-burning locomotive of Messrs. Sharp, Stewart, and Co., Atlas Works, Manchester. Their improvements are applicable to every kind of locomotive, and do not interfere with any arrangement yet introduced for burning coal or any other fuel. They consist—first, in dispensing with the usual slide bars and slide blocks, the piston rods being longer than usual, and their outer end supported by bushes, which are bolted to the cross brackets. The inner ends are supported by the stuffing-boxes of the cylinder as usual. On the middle of each piston rod is fixed a cross-head, which communicates motion to the driving axle by means of the connecting rod. By adopting this plan, and supporting the piston rod on each side of the cross-head, the slide bars, slide blocks, and present expensive cross-head are dispensed with. An easy means of relieving the cylinder from the weight of the piston is secured, so that it may move truly and freely within it. Repairs of the guide motion are also greatly facilitated, for, when one of the guide bushes is worn, a new one can readily be put in, or a liner may be introduced into it. By giving the piston rod sufficient diameter, a large wearing surface in the guide bush and cylinder stuffing-box is obtained, and all unnecessary weight may be avoided by making the piston rod hollow—a matter of some importance in the reciprocating mass. This arrangement also allows from 6 to 9 in. greater length of connecting rod. The second part of the invention consists of an improved arrangement of pumps for supplying water to the boiler. A steam-pump is provided to supply the necessary feed water for regular working; and there is also a supplementary engine pump, which can be

speedily coupled to one of the back gear eccentrics; the ordinary pumps are thus dispensed with, and when the engine is in motion, if the pump-rod be disconnected from the eccentric, no part of the pumping machinery is at work. The third improvement consists of an apparatus for superheating the steam before it is taken to the cylinders; the chamber for effecting this is formed in the upper part of the smoke box. The steam generated in the boiler is admitted through in the upper part of the longitudinal pipe fixed in it, and passing down between the tube plate and a baffle plate fixed for the purpose, enters the steam chamber at that part which is most exposed to the heat of the gases coming from the tubes into the smoke box. The funnel, which passes through the steam chamber, enables the gases from the fire-box, and the exhaust steam from the cylinders, to escape freely, and the dried steam is conveyed from the upper part of the steam chamber, through a pipe, downwards to the cylinders. The advantage resulting from this arrangement for drying the steam are—that the steam dome, and the steam-tight joints within the boiler, are dispensed with—the superfluous space in the smoke box is reduced, thereby diminishing the area to be acted upon by the blast—the chimney is increased in length, thus increasing the natural draft, and rendering less artificial draft necessary. The regulator is placed in the smoke box in such a position as to allow access to the tubes, and can, therefore, be examined at any time without breaking any boiler joints.

Among the novelties in rails, are the patent double rails of Mr. THOS. SYMONS, of Flushing, Cornwall, intended particularly for goods and mineral transport; and, in order that they may be firm, the base for the tread of the wheels, is extended so that a sufficient weight can be placed on the driving wheels for adhesion; thus the engine runs freely and steadily at all speeds, and the brakes become more serviceable, because the wheels have more surface friction. The rails are each placed diagonally, and support a longitudinal oak string; each rail has four equal sides, so that they may be turned and returned as they become worn.

A very practical mode of laying flush rails in streets is proposed by Mr. W. B. ADAMS, which consists in the use of the ordinary double headed rail, laid on its side and bolted down to cast-iron blocks at the joints, through which the tie bars pass and are secured. A second proposition, far less likely to succeed than the former, consists in reversing bridge rails, and having a flange on the centre of the wheel. Timber is not required in either case, and the iron rails rendered useless for ordinary railways, would be applicable.

Passing the timber bending machinery, which we have already fully described, the next object of importance appears to be an improved apparatus for making moulds for castings, by MR. JAS. HOWARD, of Bedford, in which the patterns are mounted upon a sliding mandril. A plate surrounds the pattern of the exact shape of the profile, and when the mould has been rammed up in the ordinary manner, the mandril is drawn down by means of a screw. The mould is then free to be lifted off the plate, without risk of disturbing the moulded sand or injuring the sharp edges of the impression. By this method of moulding, the usual processes of jointing, coring, rapping, and drawing the pattern, incidental to hand moulding, are avoided, and so the use of skilled labour, in the production of a considerable variety of castings, is rendered, in a great degree, unnecessary.

Mr. P. A. GODEFROY, of King's Mead Cottages, New North-road, proposes the admixture of prepared cocoa nut shell with gutta percha, by which a cheaper article, and one not so much affected by variation of temperature as gutta percha, is produced.

A large number of other miscellaneous articles is exhibited, but the above comprise those likely to prove most interesting to our readers; we will, therefore, conclude with the metallic flesh-brush of Messrs. D. J. WALTON and SONS, Haughton Dale Works, Denton, near Manchester. This invention consists in the application of very fine wire to supply the place of bristles in brushes generally. The wire is set in an elastic cloth ribbon or band, and pillowed on a soft and yielding cushion; therefore, the teeth pass pleasantly over the surface of the skin, without teasing or abrading it.

ROCKS AND MINERAL DEPOSITS OF SOUTH AFRICA.—No. III.

The theory which was suggested in my last paper, as being sufficient to explain the formation of the Table Mountain sandstone, will appear to be the most natural to any one who has observed and examined that rock carefully, near Cape Town, as well as on all spots from there to Great Namaqualand;—who has not been led to adopt erroneous and prejudicial opinions by the superficial appearance of the granitic base rock, and who has thus not been led to believe at once in a volcanic (plutonic) agency, when finding a thin shallow seam of a basaltic, more silicious, or more hornblendic rock, being wedged into that granite here and there, and who, at the same time, is able to place before his mind's eye the whole of the country from Table Bay to the Orange River, with all the rocks in a correct proportion of all their parts, without omission of any fact or peculiarity observed in detail, not leaving out the vast quantities of sand, conglomerates, boulders, &c., that are covering all the lower levels.

Of mineral deposits, I found in that rock none, except here and there thin veins of iron, and occasionally manganese (chiefly silicates). In localities where the surrounding country was highly impregnated with copper, I found the same rock coloured on many spots by silicate of copper (the rock being, so to speak, impregnated with it), and only at a few spots I found veins of copper ore within it; which, however, were always very thin, and apparently continuing neither in length nor depth. On one spot, in a cave high up on the side of a lofty mountain (near N'Omis), I found carbonate of copper covering an open sub-divisional fissure of the rock, forming a layer of about half an inch in thickness, being attached by its lower side to the rock, and representing on its upper side an appearance resembling stalagmites on a small scale. In general, however, the Table Mountain sandstone appears to be rather unfavourable to the formation of any large and bulky mineral deposits, and all the deposits found enclosed within it might appropriately be designated by the term "erratic."

Fossils do not appear to occur in the real original mass of that rock; such are, however, found near it, chiefly on the less steep slopes of the mountains composed of such rock, and they belong to species of plants which are now still noticed to be growing in the vicinity. There is to be mentioned yet another peculiarity of that rock,—that on many spots there are noticed nodules of quartz (mostly milky, and when broken up, and found loose in water, vitreous), or small, mostly oval, apparently waterworn quartz pebbles enclosed within the very mass of that rock; and I should thereby be induced to believe that this rock was a sort of conglomerate, formed by sediment, if several facts, partly observed by myself, partly by others, did not make me hesitate before adopting that view.

Numerous facts observed by miners and others would, with many, place it beyond doubt that quartz veins (and quartz crystals) are formed generally by a kind of slow and gradual crystallisation of silicious particles, produced chiefly, or at least greatly favoured, by the agency of water, of moisture; and quartz veins (often shallow and wedge-like) are frequently noticed to occur in rocks of an acknowledged recent formation. The cleavage planes of various rocks have been, and are being, lined with quartz, by the simple process of water (moisture) electricity, &c., gradually absorbing those components of the rock which are more soluble than quartz (*e. g*, the argillaceous, alkaline, calcareous, &c.), in a higher degree than would be the case with the silicious components; and the latter, being thus left behind in greater quantities, would gradually increase in bulk, and thus form at last a distinct vein or band of quartz. The numerous runs of quartz which are noticed frequently, not only in primary crystalline, but also in rocks of a more recent origin, we might accordingly explain by the law—that all those agents which cause the decomposition and absorption of the softer (alkaline, argillaceous, calcareous, &c.) components, favour in the same degree the formation of quartzose (silicious) aggregations.

The greatest quantity of such quartz pebbles of a water-worn appearance I noticed to be imbedded within the quartz rock (Table Mountain sandstone), on spots where there could be traced a greater amount of felspathic components, and those pebbles were there opaque, of a yellowish or reddish colour, and many of them, when broken, containing within their very mass nests of a yellowish or whitish powder, such as is derived from the decomposition of felspar. On higher and more worn spots of that rock, those pebbles assumed a light milky colour, and only faint traces of such a felspathic powder within them; and where the surrounding rock was exclusively silicious, then those pebbles contained no trace of felspar or iron, but were perfectly colourless, mostly transparent, and generally of a smaller size. I never found such pebbles of a very large size embedded in the rock, but they were generally not larger than a goose's egg, but in most instances smaller than that; and taking all the pebbles I observed thus embedded in the whole country, from Cape Town to Namaqualand, I should say that all the pebbles observed in all the respective localities would nearly be of a uniform size.

Now, it might be possible that, in a river or a lake, or the sea, there should accumulate on certain spots pebbles of one uniform size, owing to the force of the current not being sufficiently strong to carry to that particular spot pebbles of a larger size, and still being strong enough to carry off from there pebbles of a smaller size, thus leaving there accumulated pebbles of a certain uniform size. But it is not very likely that such a phenomenon should have taken place so uniformly over a space of several hundred miles in extent—that vast space on which those quartz pebbles are to be observed embedded in that Table Mountain sandstone; and I think that this circumstance justifies me, in the first place, in not taking the fact of the occurrence of such pebbles within the Table Mountain sandstone, as a proof that the said rock had been formed in the same manner as any other conglomerate—that that rock, in spite of its very distinct crystalline structure (as revealed by its cleavage plane), was a conglomerate; for in any conglomerate we find pebbles of various sizes, very small as well as very large; and the pebbles within that quartz rock (Table Mountain sandstone) are all of a small, uniform size. Then the facts of the variety in colour of such pebbles (which appears greatly to depend upon their situation), and that there are found in many of them, right within their very mass, cavities of a mostly crystalline shape, filled with a felspathic powder, remain still to be explained; and the supposition that those pebbles were the water-worn fragments of broken-up quartz veins, would not at all appear sufficient to explain them satisfactorily.

The Table Mountain sandstone rests, as already mentioned, invariably upon a granite base rock, and in examining that base rock itself (*e. g.*, near Cape Town, on its southern, or Kabous Kerk, near its northern extremity), we find that large crystals of felspar, either reddish or white, form a conspicous part of its components.

The above-mentioned doctrine, that all those agents which cause the decomposition and absorption of the softer (alkaline, argillaceous, &c.) components of a rock, favour in the same degree the formation of quartzose (silicious) aggregation, would apply to any particular mineral in detail, as well as it does to large masses of rock in general; and a crystal may accordingly become gradually more and more silicious by its alkaline and alumnious, &c., components being gradually more and more absorbed by that process; and where the equilibrium of the force that caused and governed the crystallisation of the crystal of felspar, has been so much encroached upon and disturbed, as to admit of such a change taking place in the components of the crystal there, that crystal would gradually assume a roundish shape, even without the mechanical action of water being required for that purpose; for a globular shape is that shape which any substance will naturally assume, if it is not compelled by the influence of a certain crystallising force to assume another, a crystalline shape; and the theory that all those small roundish pebbles are nothing else but crystals of felspar thus metamorphosed, would, at the same time, afford a satisfactory explanation of the fact of such felspathic powder being often found occurring right within such pebbles in small cavities of a more or less crystalline shape; and crystals of felspar, the corners of which, on a close examination, reveal a less sharp, angular, crystalline shape, but do represent already a somewhat roundish, worn appearance, may be noticed to occur in that granite, not only in specimens found near the water-worn surface of it, but in crystals of that felspar that are broken fresh from the parent rock.

Whether the doctrine, that minerals would assume a roundish, water-worn shape, without being actually water-worn, could be applied in more instances than in those of such peculiar quartz pebbles, could only be ascertained by a careful observation; but it is not improbable that many phenomena in rocks, that are classified at present amongst the conglomerates, could be more satisfactorily explained by it. May the principle, which causes not only pebbles in rivers to assume a roundish, globular shape, but also the corners and angles of blocks in the field to become gradually roundish, not be active to some degree even within the very mass of a rock?

JULIUS.

GEOLOGY—PRIVATE LECTURES ON THE EARTH—No. III.

PRODUCTIONS OF THE PRESENT, AND RELICS OF THE PAST.

Having thus taken a general view of the organic system, existing respectively in the three great zones, we are now better prepared to enquire into phenomena wherein fossil remains of the living representatives, and the conditions under which they are found, form the greater portion of the evidence from whence our generalisations and deductions proceed.

The following remarks, in reference to geological formations, are confined simply to the sedimentary or fossiliferous rocks; and again, not so much to the structure or stratigraphical arrangement of these, as to the *order* of occurrence of their organic contents. The whole series of the sedimentary formation has been divided in the following manner:—

I. PRIMARY OR PALÆOZOIC—Lower and upper Silurian, Devonian and old red sandstone, carboniferous. Lower new red sandstone, magnesian limestone.

II. SECONDARY—Upper new red sandstone, liassic, oolitic, wealden, cretacious.

III. TERTIARY—More recent deposits.

I. PRIMARY OR PALÆOZOIC.—This division, from being the lowest of all stratified rocks, is necessarily the oldest, or first deposited, strata: we shall here notice its two principal divisions.

Silurian System.—The organic remains which are characteristic of this group are principally belonging to the animal kingdom; those of vegetable origin being comparatively few and unimportant as compared with the fossil flora of the carboniferous system. All the fossils that have as yet been found in these rocks are exclusively marine; this is a fact deserving of some attention, and will, in the course of these lectures, be clearly accounted for. But all such forms as do occur belong to high grades in the scale of organisation, consisting of representatives of the radiata, mollusca, and articulata proper to the sea. Remains of fish have also been discovered in the upper part of the Silurian series; but the class of animal forms which may be said to be characteristic of the whole system are principally the following:—Taking the predominance of certain fossils as they occur from the lower to the upper Silurian rocks, we have, among the molluscs, the genus *lingula*, a brachiopod, which, as Sir C. Lyell states, "belonged strictly to the living genus *lingula*," now found, as before-mentioned, in the southern hemisphere. This shell, together with the remains of species of trilobites, are the chief fossils of the lower Silurian rocks. The lowest beds of the upper division of this system are characterised by an abundance of trilobites and corals; as we ascend, genera, belonging to the cephalopoda, make their appearance; such as *orthoceras* and other chambered shells. Species of the *terebratula*, *lingula*, and other brachiopods are found as characteristic of the upper divisions, together with *orthis*, *avicula*, *trochus*, *orthoceras*, *bellerophon*, and others. Besides zoophytes and other fossils of minor importance, teeth and jaws of large fish have been discovered. Hence, the deposits now forming in the southern hemisphere, south of Van Diemen's Land, may be considered to have a very close analogy to the Silurian epoch.

Carboniferous Group.—Nothing can be more striking than the prevalence of vegetable forms in the strata comprehended in this system; they are found not in the actual coal itself, but in the interstratified shales and sandstones. It must be borne in mind that many of the plants have been found with their roots attached, and in an erect position in the soil, now consolidated; showing that they really lived and died on the spots where they are now found, and have not been transported there by oceanic currents from distant climes. We shall find, on an investigation of these, that peculiarities will be presented, both in regard to the preponderance of certain genera, and also in respect to the vigorous growth of each individual. But before entering into these points, we will examine the several forms which may be said to be characteristic of this series of rocks. Of the animal kingdom, no representatives worthy of notice are found fossilised; the organic remains being almost exclusively of vegetable origin, and of these land plants form the greater portion. The genera that have been determined amongst the carboniferous fossil flora consist chiefly of *sphænopteris*, *pecopteris*, *neuropteris*, *cyclopteris*, and others of the fern family. *Sigillaria* and their roots (stigmaria) constitute a large portion of the carboniferous vegetable matter. Among coniferous trees belonging to this group there are five genera, some of which are closely allied to the araucarian division of pines. *Calamites*, another coal fossil plant, and closely allied to the "horse-tail" now living, are said to be extinct, but we have no doubt but that the researches into the unexplored regions of the south temperate countries will furnish at least its representative. The genus *lepidodendron*, which is also found fossilised in the coal-measures, is considered to occupy an intermediate position between the *coniferæ* and the *lycopodiaceæ*. Here, again, we have an exact representation of the actual deposition now going on in the swamps, lagoons, estuaries, on the coasts of Australia, New Zealand, Chili, and Patagonia, and covering the Antarctic-marine deposits—*i. e.*, carboniferous on Silurian.

II. SECONDARY.—The organic remains of this division of the sedimentary series are principally of tribes of zamia, with some coniferæ. Cycadaceous plants constitute the most numerous family; but other forms, more or less allied to palms, are found comparatively abundant. Among the fossil animal remains may be mentioned as the most important, those of large saurians, and immense reptiles, as well as numerous ammonites and belemnites. Remains of batrachian reptiles, for example, the labyrinthodon and rhyncosaurus are found in these rocks. In the upper strata, ammonites and belemnites prevail together with species of *cypræa*, *olive*, *mitra*, *trochus*, &c., which, with the exception of the two former, are at the present time known to be inhabitants of tropical seas. We have here again an equally striking analogy to the accumulations of the organic remains of the torrid zone, and that they lived and died on the spots where they are now found entombed in a fossil state. Similar to the deposits now forming at the mouths of the rivers Amazon and Orinoco.

III. TERTIARY.—This series is only partially consolidated, and consists of sand, chalk, clay, gravel, &c., containing marine as well as terrestrial remains, more or less corresponding to those forms now existing north of the equator. It must be remembered that the so-called tertiary formations of the southern hemisphere present very different organic contents to those of the northern. There are no relics of *tropical* remains found in the deposits in the south temperate zone, but only organic remains, belonging to the southern hemisphere. This is too important a fact to be neglected in geological enquiry. Leaves of elms, poplars, and other forest trees, peculiar to the north temperate zone, are found embedded in the tertiary of Europe. Forms of the animal kingdom abound plentifully, and consist of species now existing in the zones where such tertiary deposits are found; consequently, we have a complete set of all the productions of the different zones in the rocks of the northern hemisphere, but not so in the south.

MINES AND MINERALS OF AMERICA—No. IX.

THE CHIRIQUI IMPROVEMENT COMPANY, NEW GRANADA, SOUTH AMERICA.

Since I wrote you last on this subject [*Mining Journal*, March 7] I have had an opportunity of more closely investigating the merits of the company's undertaking. I find their charter is of a most liberal character, and although their nominal capital is only 400,000*l.*, they have the power of increasing it to any amount needful to meet the requirements of the object sought. It possesses the advantages of non-individual liability, and, although an American company, its offices may be situate in London, and, if found more advantageous, may be under British control. The property not being in the United States, it is considered a purely international medium of investment, and on this account offers additional advantages and security to the capitalists on both sides of the Atlantic, and I believe becomes more conducive to a reciprocity of mutual interests. The grant from the province to the company of the exclusive right of way for 60 years over the isthmus, with the concession of about 100,000 acres of land, is to encourage the colonisation of the country by Europeans of English extraction. The Government do not appear to have any predilection in favour of place of birth; they are so well satisfied that if the work be commenced by English, whether native or American born, it will be carried out in its integrity. On the completion of the turnpike-road, all the land granted becomes the freehold of the company; and what is of greater value, they may locate it wherever they please along the line of road, consequently the settlers may have almost immediately a clear and indisputable fee simple title to the lands they may select for cultivation. The reversion of the turnpike-road to the province in 60 years' time is of no consideration to the company, for it will have been paid for many times before the expiration of that period.

There is one very remarkable, at the same time pleasing, feature in the mineral grants, and shows with what avidity the Chiriquians assimilate to modern civilisation. In the grants of the coal mines from the province of Bocas-del-torro a royalty of 10 cents per ton (5d.) is to be paid by the colliers, the whole amount of which is to be exclusively applied to the erection of schools, and other educational purposes, for the good of the rising generation. I think no argument can adduce a more tangible proof of the progressive desires of the people than this: it shows they have taken a step in the right direction, and that they are far in advance of their neighbours.

General Mosquera, the former President of New Granada, has shown great solicitude in the success of the company, and has rendered great aid in the promotion of its interests with his Government. The new town on the Atlantic is to be called, after his name, the port and city of Mosquera. Senor Paredes, late Minister of New Granada, in the United States, and also General Herran, the present Minister, are warm friends of the company, and can fully appreciate the merits of the enterprise. The knowledge these gentlemen possess of general mercantile affairs induces them to think that if the undertaking is founded on a real Anglo-American basis, it will be of greater benefit, not only to the several individuals immediately concerned, but to the entire province and community at large, and that it will become a total barrier to all fillibustering in this quarter. The transit route through Nicaragua is now suspended, and will be quite useless until the evacuation by Walker and his army of fillibusters. They are, however, at this present moment in a somewhat critical fix; but if they are vanquished, it will be a long time before peace and order is again restored. The germ of internal contentions and civil war has sprung up among the entire people, and until it is totally eradicated life and property are insecure, and commerce cannot flourish. Again, it takes three days across the country by this route, and that, too, through a very sickly climate, all of which is detrimental to a useful line of European travel.

The Panama Railroad, also, has some very serious drawbacks to becoming a good investment for the capital of the settler. The first thing is the unhealthiness of the climate, and, secondly, a total absence of any safe harbour on either side. I am told it is not a very uncommon thing for vessels to lie two or three days off Aspinwall before they can land their passengers. It being an open coast, the piers and jetties are often washed away, and immense damage done by the "northers;" it is, therefore, not destined to become the great highway of nations.

I perceive by the papers that there is a project on foot in London for constructing a railroad across the isthmus through Honduras. Now, this would be a long, tedious, and very expensive route, taking several years to accomplish; while the road from Chiriqui Lagoon, on the Atlantic, to the Bay of Golfo Dulce, on the Pacific, could be put in running order in 18 months, and at only one-fourth the cost of any other road, having the finest and most secure harbours at each terminus. These are serious and very important considerations for both the British and American Governments, and more particularly for the former. It is well known by the English coast surveyors that Admiralty Bay, or the lagoon, would afford one of the best stations for the West Indian fleet, and here they may be supplied with fresh provisions and the finest spring water. Next to its importance as a place of safety, it becomes the coaling station of all the South Atlantic steamers. At the present time all the coal for the steamers running between New York and the isthmus is sent by sailing vessels from Pennsylvania, and costs at Aspinwall $12 per ton. Now the Chiriqui Company can supply the coal at the same place, and make a large profit, at $6 per ton: here, then, is a saving of $1000 per voyage, while the trade that will spring up on opening the new road, and building the new town will provide enough goods and passenger freight to add another $1000 profit per voyage to the steam boat proprietors. It is generally thought the country will be rapidly settled, for the natural fertility of the soil, the facilities for transport, a ready money market, and the healthiness of the climate renders it one of the most desirable and advantageous locations for a colony to be found any where between Texas and Ecuador.

Chartered companies are generally supposed, in a new country, to hold an entire monopoly over all the lands where they locate a colony, to the exclusion of private enterprise; but in this instance it is not so. The grants made by the Government are very definite in their limits of sectional area. Haciendas, or farms, of the first quality and location are offered to the immigrant or capitalist, and can be purchased at a very low price per acre, from either the Government, the company, or the private native landowners of the province, with titles all clear and indisputable. An English farmer, with a large family, a few agricultural implements, and $500 at command on landing at Chiriqui, may possess a large estate, and in a few years become an independent and opulent man.

During my sojourn in America I have visited every free state in the

Union, as also several of the slave states; and although my pursuits are professedly of a geological character, I have not overlooked the progress of agriculture. In my rambles I have met with many disappointed men—small English, Scotch, Irish, and German farmers—allured by the reports at home of cheap lands and almost ready-made fortunes, by merely coming after them. They have left their native land, and come into the eastern states; once here, to think of returning is almost hopeless. They find the land cheap enough—in that they are not disappointed—but the price of farm labour is so enormous that it utterly excludes the small man from becoming a landowner, or even a tenant farmer. He then has to work as a labourer himself, and thus hopes in time, by saving money, to become an employer. Many have returned home, who could get there, others have entered into other pursuits; the daughters, instead of being in the dairy, are placed in a factory, and the boys become miscellaneous labourers. In the New England states farms certainly can be bought cheap—say, from $12 to $30 per acre, but the land is so poor, in consequence of injudicious over-cropping, and being worked for years with little or no manuring, that it is worked out, and requires a considerable sum to bring it again into a productive state. With these expenses, and the high rate of field labour, many hundreds of farmers do not realise, after years of care and toil, so much as some pay the farm labour employed to help them.

The traveller, in passing through the district where I reside when at home—Western Massachusets—is delighted with the neat appearance of the homesteads, and the apparently happy, decent, easy, and contented position of its occupants, but he little knows how this is brought about. On enquiry, he will find it is by the closest thrift, and an unceasing application to their business. The luxuries of life they know of only by name; goaded on by their daily wants, no time is allowed them for recreation, and so accustomed are they from childhood to this continual drudgery, that even had they leisure time they would not avail themselves of it for the purposes of recreation. It is this that gives to the New England farmer that stoical trait in his character—this is the chief inciting cause that leads him to those petty acts of meanness for which he is proverbial, and which has branded him with the cognomen of "Yankee." Now, all this seeming show of contentment is quite superficial, a proof of which may be daily seen in all public advertisements, headed "Homestead for Sale—Owner going West." But to the settler in Chiriqui what a very different prospect is before him: the finest lands he can purchase at from $1 to $5 per acre; it is maiden ground, and unwrought—consequently it yields abundantly. Farm labour is only one-third the price as in the States, and with one-half even of this double the produce can be raised. In some parts of the province, where the land is under a proper state of cultivation, two crops a year are often taken from the fields. Provisions on an average are not much over one-half the price of what they are in the eastern states. Import duties are low, and taxes quite nominal.

As regards the seasons, the country may be said to enjoy almost a perpetual summer; there certainly is no cold in its winter, the temperature very seldom getting down to 50°, or ranging above 95° to 100° in the hottest weather. It may be urged as an objection to Chiriqui that the climate is sultry; but from all I can learn from visitors, and the reports and other documents before me, which I have very carefully examined, the temperature does not give a greater mean than 95° in summer. Now, during the hot weather last summer in Illinois and Indiana, the thermometer stood for days from 105° to 110°; in New York, last July, it was at 99° in the shade, and 96° in Massachusets; while the extremes have been this winter as follows:—New York City, 12° below zero; Albany (N.Y.), 28° below; Massachusets, 26° below; Illinois and Wisconsin, 36° below; and at Montpelier Vermont the mercury froze: it must, therefore, have been down to 40°, and, perhaps, lower. Now, if the European can bear, without sensible injury to his constitution, such extremes of heat and cold as this, what real objection can be urged to his living comfortably in a temperature that only ranges from 50° to 95°. I think such doubts, if any are entertained, must be purely imaginary. A curious fact presents itself in connection with the organisation of this company: the originators of the scheme and present chief promoters are a Frenchman, an Englishman, and an American, and it is by their joint endeavours all those valuable concessions have been made to the company. I find they have at Golfo Dulce about 1,000,000 acres of the best land along the shores of the bay in fee simple, and all paid for; 100,000 acres along the line of the new road, to be transferred by deed in fee simple when the road is completed; and 40,000 acres in fee in the vicinity of Bocas-del-terro, to be deeded when the coal mines are once set in active working; with 190,000 acres of mineral rights, on which is a royalty of 10 cents per ton for the first 10,000 tons, and 5 cents per ton for ever afterwards. It does not appear that any dues are to be levied on the copper and lead mines, or the gold deposits. The boundary line between Costa Rica and New Granada has been definitely settled between the two Governments.

Mr. Morel, the company's agent, under date Jan. 26, writes to say that by March 10 the company will receive information that he has passed over the whole line of track of the new road on horseback, in company with the authorities, in less than 12 hours. This may be considered a good beginning, and augurs well for the future.

I have a deal more useful information to send you, but as this article has run over space enough for the present, I must conclude by hoping soon to hear our English friends in London have joined heart and hand in this interesting enterprise.—*March* 4. CHARLES S. RICHARDSON.

Errata in No. VIII. article, Mining Journal, March 7:—

SECRETARY.—Upper group of seams: 12½ ft. thick; 75 lbs. to the foot cube, or 3·766 tons per yard aggregate, less 25 per cent. waste in working, gives=13,675 tons per acre.

POPE'S ISLAND AND SADDLE HILL.—Middle group: 20 ft. thick; specific gravity, 1·270=79·37 lbs. (say, 80 lbs.) per cubic foot, equal to 6·428 tons per square yard. Allow one-third for waste in this instance, being "thin coal," it gives 20,740 tons per acre.

CHANQUINOLA RIVER AND CULTIVATION CREEK.—Lower group: thickness not positively known; coal weighs 82 lbs. to the foot; aggregate thickness not less than 10 ft., equal to 10,680 tons to the acre.

IRON MANUFACTURE—CORT'S INVENTIONS.

The following is an extract from a letter, dated March 24, from Mr. S. B. Rogers, Metallurgist, Nant-y-Glo, Monmouthshire, addressed to Mr. Richard Cort, showing that one of the inventions patented by Henry Cort, seventy years ago, and now in general use all over the world, is second to none in the iron trade—balling, or piling and heating in an air furnace—without which rolling and puddling never could be carried fully into effect; that the refinery, or "finer's metal process," referred to by Hen. Cort, in his patent in 1784, and claimed by the late Mr. Samuel Homfray as his invention, was used any time within more than half-a-century before he was born, and is now very generally abandoned, though not wholly extinct, while Henry Cort's inventions remain "intact to the present day," no railways in this or any other nation being used or made without them:—

"I quite agree with the contents of the excellent letter of Mr. Truran, particularly his remark on the 'Cort case,' treated as an affair of the nation rather than as a claim against the iron-masters, &c., because Mr. Cort's inventions—the 'puddling, groove-rolling, and balling processes'—have benefited the nation in a much more extensive degree than any individual ironmaster, owing to the competition necessarily existing in so extensive a trade as the manufacture of iron. I hope, therefore, that adequate compensation will be awarded to yourself and family in the ensuing Parliament, for the losses and privations you have hitherto had to contend with for a long period of years, including also a liberal grant to yourself and family for the very great benefits conferred on the nation by the inventions of your worthy father.

"In the paper entitled, 'Statement of the Claims,' &c., and in the first paragraph, it is mentioned that Henry Cort was the inventor of two processes (puddling and rolling with grooved rollers); now, it appears strange to me that the other invention of your father should have been omitted, i. e., the 'balling or piling of iron in an air-furnace, to the extent of half a ton in a pile,' which I consider to be an invention second to none in the iron trade. Mr. Truran's observations on this point are both just and excellent, for without the piling process and reheating in an air furnace, the puddling and rolling processes could never have been fully carried out. In your father's patent of 1783 occurs the following, at page 3 and line 23, 'Instead of the use of that refinery.' I should read, 'instead of the use of *the* refinery,' for it clearly appears, from many authorities as well as traditions, that 'refineries,' were in use even before Mr. Henry Cort was born, in which 'fineries' a pig or two of iron were sunk in coke or charcoal, and the fused metal run out, and again fused (after cooling) once or twice, until it approached almost 'into nature,' or semi-fibrous state; and which then constituted 'half-blooms.' The 'fineries' were no doubt the embryo or model of the present 'coke refineries' the introduction of which the late Mr. S. Homfray claimed as his invention or modification—the latter rather, if we are to believe traditions in the trade with respect to the first introduction of them at Penydarran, in 1789 (Mr. D. Mushet is aware of the 'traditions' here referred to, and which were stated in my last note to him, about the 10th of the present month). The process in the present 'refineries' is not carried so far as was usual in the old 'refineries,' otherwise the metal (often 30 cwts.) would not be sufficiently fluid to be run out into cakes. In Mr. Payne's patent, 1728, reference is made to the fire called the 'refinery' in the common forges (page 3, line 21), and in Mr. Cort's patent, 1784 (page 7, line 25) reference is made to a 'refinery,' where he recommends pig or cast-iron 'to be sunk down into the finery into half-blooms.' Also in the same page, lines 23 and 24, he refers to the usual process of refining with 'charcoal or coke.' How the present coke refineries can be said to be a new invention at any time of the trade within the last 130 years, I am at a loss to imagine.

"Now, with respect to Mr. Payne's patent, 1728 (a document quite new to me), there is certainly a resemblance, as well to the puddling and balling processes as to the use of the grooved rollers. Mr. Payne also demolishes a cherished notion of mine with respect to the use of common salt in certain processes of iron metallurgy; hence, the old saying, 'Nothing new under the sun,' contains more truth than people—inventors especially—are willing to admit. Now, Mr. Payne's proposal for using salt, &c., in 'refining pig, sow, or other brittle iron,' is supported by a good and philosophical reason, namely, that it 'will make the like change as charcoal does with fire called 'refinery' in the common forges, and will render the same into a state of malleability.'—page 3, lines 20 to 23.* Here we have (as far as records go) a real and good invention, publicly proposed, and supported by the best philosophical reasons of its efficiency; and yet it has lain dormant for a hundred years or more! But with respect to Mr. Payne's ideas as to what is now termed puddling, reheating, and groove-rolling of iron, they are so crude and indefinite, technically and philosophically, that we need not wonder at them (the germs though they undoubtedly were of great discoveries) being unpatronised by ironmasters of those days. Indeed, Mr. Payne's description of his 'engine' for driving his rolls is tinctured so much with the ridiculous that, probably, the whole of his inventions were considered to be of a fanciful, *windy* nature, and so passed into oblivion. Your father gives reasons and principles for his inventions, and had the power also of carrying them into practice, hence I cannot see how Payne's 'propositions' (for they appear to be nothing more) can militate in the least against Henry Cort's perfected inventions which are intact up to the present day."

In fact, Henry Cort patented a set of improvements in iron manufacture, which, by their combined operation, as stated in the *Mining Journal*, *Mechanics' Magazine*, *Engineer*, and *Morning Post*, rescued the iron trade of Great Britain from almost total extinction, and raised it far beyond the rest of the world combined—results which have excited the admiration of the nation, and obtained from the press of this country a more spontaneous and more general expression of feeling than the claims of any other inventor ever elicited.

* Henry Cort, in his patent, 1784, disclaims "the necessity of using finery charcoal, coke, chaffery or hollow fire, blast by bellows or cylinders, or otherwise, or the use of fluxes in any part of the process." Dr. Joseph Black, Professor of Chemistry at Edinburgh, who superintended twenty-eight trials of Cort's patent iron in all the Royal dockyards in 1785, when it was proved superior in *ten*, and equal in fifteen, to the best Swedish iron for naval purposes; and Mr. David Hartley, another celebrated chemist at that time, state in their reports in 1786—"The *ordinary mode* of converting cast-iron into *malleable* iron is by the use of a very great quantity of *charcoal*, which contains what chemists call 'phlogiston,' and which has the quality of remetallising demetallised particles which are mixed up with iron while in fusion. The method used by Mr. Cort is not by charcoal; he uses the *flame* of sea coal entirely, because it is not his principle to remetallise any of the demetallised particles, but to expel them altogether expeditiously at a welding heat, by the use of grooved rollers instead of the forge hammer."

Meetings of Mining Companies.

LINARES LEAD MINING COMPANY.

The half-yearly general meeting of shareholders was held at the London Tavern, Bishopsgate-street, on Tuesday,—Mr. WM. WARNE in the chair.

Mr. COLOGAN (the secretary) read the notice convening the meeting.

A statement of accounts was exhibited, from which the following is condensed:—

Balance last audit	£12,072	8	2		
Profit for six months to Dec. 31	5,199	10	7		
Exchange account, transfer fees, &c.	56	2	0=£17,328	0	9
Dividends, July and October	7,497	10	0		
Income tax, &c.	933	6	8=8,430	16	8
Balance in favour of company			£8,897	4	1

Mr. COLOGAN then read the following report of the directors:

In conformity with the Deed of Settlement, the directors have placed before you the accounts for the half-year ending Dec. 31, and have now again to report to you the state of the workings of the mine, and the general position of the company.

Mr. Henry Thomas, and the agents on the spot, have forwarded a very detailed report upon the mine itself, which, with Mr. Rundle's report on the smelting operations, furnishes much interesting information.

The quantity of ore raised during the last half-year has been greatly increased, and averaged 541 tons per month, without diminution of the reserves of ore underground.

The quantity of ore smelted does not much differ from that reduced during the previous six months, but a very large amount of slags have been operated upon, producing 463 tons of lead, the greater part of which has been sold in Spain at good prices. The quantity of lead brought down to the coast has been very large, and has been rapidly shipped for England.

The state of the lead market, during the latter part of the year, did not justify your directors in making any sales till the last week of Dec., consequently upwards of 1000 tons were for a long time stored in different ports in England, occasioning an unusual expense for landing and warehousing charges. These unexpected expenses, together with the fall of 2*l.* per ton in the price of lead, with the continuance of the excessive cost of carriage, have materially diminished the profits which otherwise would have been realised.

The transport of produce continues to be a source of much anxiety to the directors, the failure of the corn crops, and the high price of all food for cattle, have contributed to keep up the rates of carriage. It is hoped from the present excellent promise of the crops that the company may shortly see, if not the old prices, at least much lower rates; and the reports from Spain since Jan. announce an important reduction.

The profits for the half-year show a sum of 5255*l.* 12s. 7d. only.

The causes to which allusion has been made are not those alone which have interfered with the profits, the price of fuel has been and is still very high, and the rates of wages have also greatly increased; there is further included in the mines' cost for the last half-year the sum of 800*l.*—the expenditure for machinery and other constructions, which has hitherto been charged to the capital account as additional plant.

The large sum shown in the accounts as due on the sales of lead has been realised, and enabled the directors to pay off many of those liabilities which appear in the balance sheet.

The smelting works continue, as last reported, in good working order; and the produce of lead from the ores smelted has equalled in percentage that of the previous six months, notwithstanding the very bad quality of both the coal and brushwood fuel, which has been supplied to the works. The directors have given orders that the best quality of coals only shall be purchased during the coming season; but they must acquaint the shareholders that the supply of fuel, both for the smelting furnaces and for the steam-engine, is one which is likely to cause them much anxiety.

An alternative of smelting some portion of the ores in the neighbourhood of Cordova has been suggested to the board, and this question is at this moment under the consideration of the managing directors of the company.

It is believed that not only would a considerable saving in the amount of transport be made, but of course a large reduction in the cost of fuel; and beyond this a better produce from the ores, probably not less than 3 or 4 per cent. in pig lead would be obtained, in consequence of the greater heat which would be derived from the use of better coal supplied directly from the collieries.

The directors have again declared a dividend of 5*s.* per share, payable in April, which, with the dividend already paid in January last, will nearly absorb the balance now standing to the credit of the profit and loss account. The directors, therefore, cannot pledge themselves that the quarterly payment of dividends can be continued for the present, as the rate of future profits depends much on the expense of carriage in Spain, and reduction of mines' costs, they think it may be necessary to wait the closing of the current half-year's accounts before deciding on the next dividend.

The directors regret exceedingly to report to you that they are about to lose the services of Mr. Henry Thomas, your superintendent at the mines. Mr. Thomas has been in the employ of the company since the commencement of the undertaking in 1849, and they are much indebted to him for his untiring and zealous exertions in the promotion of their interests. The directors are happy to announce to the shareholders that they have engaged as his successor, Mr. Joseph Lee Thomas, a gentleman who for a period of three years had a similar charge in Spain, which he conducted with great ability, and to the satisfaction of his employers, by whom he has been most strongly recommended.

The directors, in conclusion, have to report that Messrs. James Crosby, William Cox, and William Loftus Lowndes are the three directors who go out of office by rotation, and that they now offer themselves for re-election.

The reports of Mr. Thomas (the superintendent) and the captains of the mines, as also of Mr. Rundle (the superintendent of the smelting works) were considered highly satisfactory; the reserves being estimated at 15,000 tons, and the smelting works were in excellent order.

The CHAIRMAN said, the very interesting reports of Mr. Thomas and Mr. Rundle left very little for him to say, and, after such reports, made his office a sinecure. It was shown that the profits were affected by the price of fuel, the extraordinary expense of carriage, and the great increase of wages. It was, however, satisfactory to state that they had obtained 1730 tons of lead during the last six months, and the reserves of the mine had not diminished. There was also a large quantity of slag upon the mine, which for a long time had been useless, but which, he was happy to say, had been turned into lead, and found a ready sale in Spain. There was one point not alluded to in the reports—the railways in Spain, which were progressing very satisfactorily, and which would be of great advantage to the company, when completed, in diminishing the cost of carriage, as at the present time they were compelled to employ mules. He (the Chairman) would merely add, that any question should be answered by any member of the board, or by their able manager.

Mr. COXHEAD contended that the cost of the fuel and the carriage absorbed all the profits, and that it would be better for them to lay upon their oars, and leave the riches in the bowels of the earth until they could save the extraordinary amount of carriage by the formation of the railway. The report foreshadowed that there would be no dividend in June, and he considered that they had better confine their operations to smelting until the railway was finished. He deeply regretted the loss of the services of Mr. Henry Thomas, but hoped the board of directors had been careful in the election of a competent party to succeed him.

Mr. COX, M.P. (a director), said that the same amount of lead had been sold for the half-year as in the preceding six months, and through the reduction in price the loss had been 2000*l.*; but they could not command the market. If the operations were suspended, they would have great trouble in getting the hands together; and the lead they had sold for 5200*l.* would at the present time have fetched 7600*l.*, as he was glad to say the market had improved. With respect to the appointment of the successor to Mr. Henry Thomas, he was glad to say that he personally knew Mr. Joseph Lee Thomas, and that he was a man of ability and integrity; he had resided three years in the district, and was well acquainted with the habits and manners of the people.

Mr. COXHEAD considered that they ought to have waited a little longer before they sold the lead, as the price had gone up.

The CHAIRMAN replied, that they should not have sold the 1000 tons, if they had not had heavy liabilities to meet.

A PROPRIETOR objected to making a dividend of 8000*l.* upon the present occasion, when the profits for the six months were only 5000*l.*

Mr. JOHN TAYLOR, jun., contended that the dividend was made out of profits fairly earned, the balance being from the last account; and if they did not see their way clear for an increase of those profits, it would not have been made. A good harvest was fully expected, and when barley was cheap they only paid 3*l.* 10s. per ton for conveyance of the produce, while for the last six months they had been paying upwards of 6*l.* per ton for. The reason for suggesting the delay of the dividend was in accordance with the feelings of a large body of the shareholders, who considered it would be preferable to await the receipt of the next six months' accounts.

Mr. RICHARD TAYLOR said, the dividends used to be paid half-yearly, but it was considered more desirable that they should be paid quarterly; and although there was some uncertainty as to the next dividend, it was satisfactory to state that the lead was now selling 2*l.* per ton higher, and the carriage was reduced 1*l.* per ton. According to their present raisings, if they obtained 2*l.* 10s. per ton extra, it would yield 9000*l.* a year; and in addition, from the present position of the mine, the working cost may be expected to be lower.

The report and accounts were then unanimously adopted, and Messrs. J. Crosby, W. Cox, M.P., and W. L. Lowndes, were re-elected directors. Mr. Coxhead and Mr. Bramwell were elected auditors, and the proceedings terminated with votes of thanks to the Chairman, directors, and Mr. Henry Thomas.

NATIONAL BRAZILIAN MINING ASSOCIATION.

A meeting of shareholders was held at the London Tavern, Bishopsgate-street, on Wednesday, Mr. ROBT. SHEPPARD in the chair.

The SOLICITOR having read the notice convening the meeting,

The CHAIRMAN said, that although an interval of five months had elapsed since the last meeting, the committee had now some valuable information to give them. In the first place, he would inform them of the past—what had been done, and recommend a course for the future. (Hear.) He had hoped to have met them earlier, but the committee had had every difficulty thrown in their way by Mr. Oxenford; and whilst they endeavoured to carry out an arrangement by arbitration, they did not neglect to protect the shareholders by continuing the proceedings in the Court of Chancery. They appointed Capt. Hitchins to do what was necessary at the mines, and sent him out with a power of attorney from a large number of the shareholders, which had been of great use to him; and to show the way in which Capt. Hitchins had done his duty, he would read to them an advertisement he had put into the Brazilian papers, on his arrival at Rio de Janeiro.

Mr. SHEPPARD then read the following advertisement:—

The undersigned hereby makes it public that the powers of Edward Oxenford as director and manager (gerant) of the Mining Company, National Brazilian of Cocaes, and Imperial of Mocambas, have been annulled by the shareholders of the company and by decision of the Court of Chancery of England. The same undersigned also makes it public that he has in his possession the titles which have emanated from the shareholders, confirmed by the Court of Chancery of England referred to, and by which he the undersigned is constituted manager (gerant) and commissioner-in-chief of the mentioned companies. Consequently all and every one whom this may interest are cautioned to beware that nobody from this time henceforth contracts or enters into any transaction whatever with the said Edward Oxenford, nor with his managers (gerants) or procurators, for the company will not recognise as valid any such contracts or transactions.—JOHN HITCHINS: *Ouro Preto, Jan.* 9.

The CHAIRMAN said that advertisement had been of great service. The objects of the appointment of the committee were threefold—first, to obtain possession of the property; secondly, to obtain an account of the assets and liabilities of the company; and, thirdly, to wind it up, and re-organise it so as to place it in a profitable position. The first point they had carried, as they might be considered as having obtained possession, as the allegations in the bill in Chancery were taken *pro confesso* by Mr. Oxenford. To prove that Capt. Hitchins had taken the necessary steps, he would read extracts from some of the letters received. The Chairman then read the following extracts:—

"I sincerely trust that I shall soon, from the produce of the mines, be able to replace to you the amount overdrawn."

"Earnings of blacks annually, 41,610 rs.=5600*l.*"

"*Jan.* 9.—I have embargoed any further payment of black hire, and have received a security from the president of the company to which they are hired that any further payment shall be made to me, my order, or successor."

"At Juis de Fara, I sent the President of the Industrial Company a formal protest, and have received his answer, which I believe to be a legal form of security for all further payments," &c.

"*Nov.* 6.—As regards Rotulo, it is left in charge of Mr. J. Ward, who has written me to state that he considers himself under my orders."

"*Nov.* 6.—On enquiring of Messrs. Denby and Rapson for the books of the company, from which I might obtain the account of the gold, and the account made out against the Emily Mine, they informed me that Mr. Oxenford had caused all the books, documents, and papers, belonging to the National Brazilian Mining Company, to be removed to his private house at the Emily Mine, under the custody of George Denby; also all the gold extracted from the Cocaes Mine, up to the time of my arrival there, had been sent to the Emily Mine, to be forwarded to Mr. Oxenford."

The CHAIRMAN continued—The information proved that they were not only in possession of the mine, but were working it; according to a note he had received, dated Feb. 24., Capt. Hitchins had commenced working the Cocaes Mine on a small scale, and intends sending the gold home. (Hear.) They had taken every possible step to secure the property for the shareholders, and had succeeded in obtaining the assistance of Government, Lord Clarendon, in reply to a letter from him (the Chairman), having instructed Mr. Scarlett, Her Majesty's representative at Rio de Janeiro, to aid Capt. Hitchins, and he need hardly add the great effect that proceeding had in obtaining their object. (Cheers.) However, he might congratulate them that they had got their property, and the committee had carried out their first object. (Hear.) The second point was the question of assets and liabilities; with regard to the assets there was a sum of 12,000*l.* due for the hire of the labourers, which they might consider as their own, but as to other amounts he could not speak about at the present moment. As to the liabilities, there was an order from the Court of Chancery to call them in, and as many of the claims would no doubt be disputed it was not advisable to discuss them upon the present occasion, as the committee intended to oppose every debt not justly due. He (the Chairman) had got into a hornet's nest for issuing the advertisement calling in the shares, but it was necessary, in order that they might ascertain who had paid or held the 30*l.* shares, and those alone would be admitted. As a reason for the delay in not calling them together earlier, every step they had taken had to be done through the Court of Chancery. They could not find the books, and as Mr. Oxenford went away, and locked up an office marked "private," they had to appeal to the Court of Chancery for an order to break into the room; and although Mr. Oxenford, jun., was present, and they tried every means to induce him to open the iron safe, he would render them no assistance, and they were compelled to break it open, which was not a very easy task; and he (the Chairman) would now ask the shareholders what they expected was found?—nothing! (Laughter.) All the books he believed were removed before Mr. Oxenford left the country, clearly proving that he never intended to render any account, and he should not be surprised if he had done the same thing in the Brazils. Having alluded to two of the objects, they came to the third, which was most important, as it was how they were to deal with the property now that they had got possession of it, and that would require the co-operation of all the shareholders; and if there was any value in getting to the winning-post, it was for their consideration how in future they were to deal with it. Captain Hitchins was out there, and must be paid, consequently funds must be raised. The committee thought of establishing a new company under the Limited Liability Act, but the present one must exist until the whole of the debts were wiped off. He believed the property was worth investigating, and instead of asking new ones to join, he thought the old shareholders ought to put their hand to the plough. The scheme he would propose was to make the 30*l.* shares 5*l.*, subject to a call of 1*l.*, which he considered would be sufficient to develope the property, and pay off the mortgage, as they had been met in the best possible spirit by Messrs. Collins and Co., the mortgagees, who he believed would take part of the money in shares. (Hear.) He should now be happy to answer any question, and would conclude by moving that the meeting approves of the steps taken by the committee.

A PROPRIETOR seconded the resolution, which was carried unanimously.

Mr. LENON OLIVER wished to know how many shares were out?

The CHAIRMAN replied 10,708, and 702 preference shares, with 3*l.* paid; but these were illegal, as they were never confirmed by any meeting, and would, no doubt, be excluded by the Court of Chancery, which was one reason for issuing the obnoxious advertisement before alluded to.

Mr. OLIVER enquired the approximate amount of debts?

The CHAIRMAN said it was a very delicate subject, and it would be unwise to mention them upon the present occasion as many of them would be expunged by the Court of Chancery. If all the shares came in they would raise about 11,000*l.*, and, of course, expenses had been already incurred; and although there was a letter in the *Mining Journal*, from Mr. Oxenford, stating that they were not keeping up the property, he, with the assistance of some shareholders, had spent some money, accepted and paid bills, and sent out authority to Capt. Hitchins to draw upon him (the Chairman) to the extent of 1000*l.* more (Cheers.) There was one observation he forgot to make which was of some importance—Capt. Hitchins had ascertained the feelings of the Brazilian shareholders and they were perfectly satisfied with the proceedings, and were ready to pay up the 1*l.* The stamps would have to be moved back from the Emily mine, and all the chain, which was of great consequence in working the mines.

Mr. CORNEY said he was one of the old proprietors, and considered it would be suicidal to wind-up the concern. The best method would be to form a new company. A gentleman who resided at Rio de Janeiro said that if the mines were properly developed they would be exceedingly productive. He had always been informed, with regard to Cuiba mine, it was not a speculation in the bowels of the earth, they had enough of gold to pay the expenses of working and crushing and leave a good profit. That portion of the property had been thoroughly tested, and there was no question as to the course they ought to pursue. He had never sold a single share, and would stick to the ship as long as it swam (Cheers).

Mr. DAVIES said they had 180,000 acres of excellent land now brought in communication by steam every week, instead of as formerly, months; the property was under a Government the best established in the world, who had honourably paid their debts, were constructing railroads, and doing everything for the benefit of the public at large. He was ready and willing to go with the committee, and stick to the ship; he came prepared to follow the leader, either to go into it or abandon it, but from the satisfactory statement he had heard from their excellent Chairman he was now prepared to play the game of "follow my leader." (Laughter and cheers.) He was prepared to take his quota, and pay at once, and more if necessary.

The CHAIRMAN, in answer to a question, said that those who refused to join would have to claim their proportion in the Court of Chancery.

After a lengthened discussion, a resolution was unanimously passed to adopt means for forming a new company in 5*l.* shares, the old shareholders to send in their old shares, in exchange for which, and payment of 1*l.* per share, they will receive a 5*l.* share fully paid up.

Mr. Hartridge was added to the committee, and a cordial vote of thanks to the Chairman terminated the proceedings.

THE METAL TRADES.—A very useful Chart, prepared by Mr. Johnston, metal merchant, of Glasgow, is now ready: it contains, amongst other information of the greatest interest to all connected with the metal trades, an elaborate diagram, showing at one view the prices of the principal metals during the past 16 years, the Birmingham wire and metal gauges and the modern Belgian zinc gauge, the weight and thickness of lead piping of various diameters, &c., thus forming a valuable work of reference for the counting-house of the iron merchant or broker. Copies may be had at the office of the *Mining Journal*. Price: Mounted, on rollers, 21s.; on plain sheet, 15s.

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The sett this company is formed to work is universally admitted to be equal to any in Cornwall, both as regards the quality and quantity of the clay produced. The machinery, &c., are of first-rate description, and capable of making a much greater quantity than is at present being made. The clay is well known, both in England and the Continent, to be of very superior kind, it having been used by the trade for the last four years. In addition to this sett, the directors have taken, at a very low royalty, a very superior mine of bleaching clay, which adjoins the above sett, and which can be opened at a very small outlay, and will, combined with the porcelain works, realise at least a profit of 20 per cent. Unlike mining adventures, this undertaking is devoid of speculation; in fact, it is a *bona fide* investment, and as such the directors unhesitatingly recommend it to the public as worthy of their consideration. There are already upwards of 3000 shares taken; it is, therefore, desirable that those who wish for shares should make application forthwith to the purser, Mr. T. LEWIS, Corn Exchange-buildings, Carr's-lane, Birmingham, from whom prospectuses, and all other requisite information, may be obtained.

Application for shares to be accompanied with a deposit of 10s. per share.

STONYWAY MINES, MATLOCK, DERBYSHIRE.—The proprietor of the veins comprising the Stonyway title has been for several years past adopting the necessary means to open the ground for more extensive operations, being fully convinced that his efforts would meet with ample returns, and he has now the satisfaction of bringing these mines to the notice of the public as a safe means of investment. The old Stonyway engine-shaft, which is close to the river, was formerly worked by means of horse-power, in drawing water from a depth of about 28 yards below the level of the river; this was done before the present improved methods of working our mines were brought into operation, and from the evidence of old men, and the Barmasters' books, the Stonyway vein was then yielding profitable returns. This was the first inducement to the present proprietor of turning his attention to other means of overcoming the partially watered state of the mine, and instead of operating upon the old workings of Stonyway, he has sunk upon an intersecting cross vein, called Jane vein, to a depth of 15 ft. below the level of the river, where he has met with very strong ore, and, as will be seen from the returns of 63 shifts only, including the expensive operation of drawing top water, that a handsome profit has been made. And it is to be borne in mind, that, inasmuch as the new discovery is not yet out of the chert measures, the riches of the vein may be very much increased on cutting the white stone and its bearing clays, which it is well known are the guiding features for mineral trial in this district; it is also a favourable circumstance that the chert beds have gone below the natural water level, as from their closeness will at all times keep the mine from being heavily watered. A few feet lower will cut into the white stone measures, but until less expensive means are adopted, and consequently greater facility given to future operations, the proprietor has come to the determination of putting the mine into the hands of other shareholders along with himself, so as more effectually to carry out the operations he first set out with. He has expended £200 in taking up ground, ripping engine-shaft on Jane vein, building coes, erecting drawing gin, driving south from shaft (where the present work of ore has been discovered), the purchasing of a 16-horse cylinder and working gear, which is ready for putting into work, and in the other general plant necessary to carry on the mine. He has been assisted by a thoroughly practical engineer as to the cost of bringing the mine into an efficient state for work, and he is fully assured by such consultation, and his own judgment, that £1000 will be amply sufficient to put down the engine already purchased, and pay the present outlay and value of the mines. It is, therefore, proposed, first to liquidate the cost and the value set upon the mines (viz., £400), the present proprietor taking 100 out of 1000 shares of £1 each, leaving £600 to be expended in the further development of this desirable trial.

A specimen of the ore may be seen at the mine; and a plan of the ground may be seen at Mr. CHARLES WALKER'S, in Matlock, to whom application for shares may be made, and from whom every satisfactory information may be obtained, as to the present state of the workings.—Matlock, March 1, 1857.

At a PRELIMINARY MEETING of the shareholders of this undertaking, held at the Wheat Sheaf, in Matlock, on the 12th ult., for the purpose of registering shares and for general purposes, it was deemed advisable that the season of the year should be taken advantage of for immediate operations in putting down machinery, and sinking the old Stonyway engine-shaft to the required depth. It is also desirable that the unallotted shares should be registered, an early application for which is requested to be made to Mr. J. WHEATCROFT, C.E., the secretary to the company.

Matlock, March 28, 1857.

THE DUN MOUNTAIN COPPER MINING COMPANY (LIMITED), NELSON, NEW ZEALAND.
Capital £75,000, in shares of £1 each, with power to increase the same.
Deposit, 5s. per share on application, and the remaining 15s. on allotment and issue of the shares.

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OFFICES,—6, GREAT WINCHESTER STREET, LONDON.

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This company is established to work the Dun Mountain Copper Mines, in the province of Nelson, New Zealand, and within ten miles of that port.

Prospectus in full has been published in the *Times* of the 16th and 18th March; *Daily News*, 16th, 18th, and 19th March; *Herald*, 20th March.

Samples may be seen, and the printed particulars and form of application for shares may be obtained of the broker, Mr. ROBERT POTTER, 1, Shorter's-court, Throgmorton-street; or at the company's offices, 6, Great Winchester-street.

April 2, 1857. FREDK. SAUNDERS, Sec.

THE DUN MOUNTAIN COPPER MINING COMPANY (LIMITED).—Notice is herby given, that NO APPLICATIONS FOR SHARES in this company will be RECEIVED AFTER THURSDAY NEXT, the 9th inst.

By order of the Board, FREDK. SAUNDERS, Sec.
6, Great Winchester-street, London, April 2, 1857.

SLATE.—The BANGOR ROYAL SLATE COMPANY have now ON HAND a large assortment of ROOFING SLATES, BLUE and GREEN, to the usual sizes, which they are prepared to SUPPLY on the usual terms, for shipment from their depôt at Bangor, or to transmit by railway; also, SLABS of all sizes.

Orders to be addressed to Mr. EDWARDS, manager, Royal Slate Quarries, Bangor.

SLATE SLABS AND ROOFING SLATES.—The PROPRIETORS of the NEW MACHNO SLATE and SLAB COMPANY (LIMITED) have, at great cost, made arrangements to convey their produce from their quarries near Ffestiniog to Conway, to obtain the great advantage of access to the railway, giving them the facility of executing orders without the slightest delay. They trust that making Conway their shipping port will not cause them to be confounded with those hitherto known as the CONWAY SLATES, as the MACHNO SLATES are ENTIRELY FREE from PYRITES, or any metallic substance liable to OXIDATION; and, from having been tested in Wales for at least half-a-century, are found to attain a degree of hardness, by exposure to the atmosphere, unknown in any other vein. The MACHNO SLABS are too well known to need comment, but the annexed valuable testimonial from Mr. Magnus, and also a strong chemical test to which they have been subjected, will better explain their quality:—

Pimlico Slate Works, Upper Belgrave-place, London, April 7, 1855.—GENTLEMEN: I very readily offer my testimony to the excellence of your slabs raised at the Machno Quarries. I prefer them to all others obtained in North Wales, with one exception, and that is much of the same quality as the Machno. The slabs can be obtained of large sizes, and of every requisite thickness. They are homogeneous in texture, strong, of good colour, free from spots and other impurities, pleasant to the tool of the mason, easily planed and moulded, and will bear exposure to a much higher degree of heat than slabs from any of the Carnarvonshire quarries.

Signed, G. E. MAGNUS.

To the Proprietors of the Machno Slate and Slab Quarries.

Liverpool, Oct. 13, 1855.—DEAR SIR: The experiments which I have tried on the specimen of slate, in reference to its capability of resistance to acids, enable me to pronounce it in every way capable of retaining boiling vinegar, without injury either to its own substance, or to the contained vinegar. A piece of the slate, weighing 95 grs., was exposed for 25 hours to the action of cold strong nitric acid; it was then boiled in the same acid for 20 minutes, and when washed, dried, and weighed, was found not to have lost perceptibly in weight. This I consider the most conclusive experiment.

Signed, GEO. C. HUSON.

Wm. Orme Carter, Esq., Machno Slate and Slab Company.

All communications must be addressed to the resident director, Mr. T. H. WHEELER, Conway, North Wales.

BRICK MAKING, AND TILE AND PIPE MAKING, BY MACHINERY.—CLAYTON'S PATENTS.

These MACHINES, now employed by the principal contractors and brick makers throughout the world, are CONSTRUCTED in sizes adapted to STEAM, WATER, HORSE, or HAND-POWER.—Machines can be inspected, or particulars obtained, on application to H. CLAYTON, patentee and manufacturer, Atlas Works, Upper Park-place, Dorset-square, London, N.W.

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NEW PATENT ACT, 1852.—Mr. CAMPIN, having advocated Patent Law Reform before the Government and Legislature, and in the pages of the *Mining Journal*, &c., is now READY to ADVISE and ASSIST INVENTORS in OBTAINING PATENTS, &c., under the NEW ACT.

The Circular of Information, gratis, on application to the Patent Office and Designs' Registry, 166, Strand.

PUMP BUCKETS.—IMPORTANT TO COLLIERY AND MINING PROPRIETORS, SHIP OWNERS, ENGINEERS, &c.

KENNEDY AND EASTWOOD'S PATENT EXPANDING RING CLACK BUCKETS.—These buckets are APPLICABLE to every description of AIR and LIFT PUMPS, and are being generally adopted, on account of their great durability, entirely dispensing with the use of leather or gutta percha. Being made of metal, the friction is greatly reduced, and have been proved to require at least one-third less power to work them than buckets made of either leather or gutta percha, and doing their work more efficiently.

The following extract from a testimonial from Messrs. Harrison, Ainslie, and Co., Lindal Moor Mines, Lancashire, who have now several in use, fully proves the foregoing:—"Having given your Patent Pump Buckets a fair trial, we are happy to bear testimony to their value, especially in muddy and sandy water. The first we put in has worked well ever since (eight months ago), whereas previous to our putting it in we changed the buckets three times every week."

Terms, reasonable, with other information, will be supplied (gratis) on application to Messrs. KENNEDY and EASTWOOD, patentees, Ulverstone, Lancashire; Messrs. HEWETT and ALLOTT, accountants, Central Chambers, Sheffield; and Messrs. H. J. MORTON and Co., 2, Basinghall-buildings, Leeds.

IRON HOUSE AND SELF-SUPPORTING ROOF MANUFACTORY, WOODSIDE, BIRKENHEAD.—Messrs. WILSON and CO. beg to call the attention of Engineers, Shippers, Farmers, and others, to their PATENT PORTABLE FIREPROOF HOUSES, STORES, SHOPS, COTTAGES, VILLA RESIDENCES, CHURCHES, SCHOOLS, FARM BUILDINGS, SHOOTING BOXES, &c., either with or without self-supporting roofs; also, CONSERVATORIES, GREENS and HOT-HOUSES.—Manufactory, Woodside, Birkenhead.

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Is respectfully requested to the superiority of those annexed, over those hitherto in use.

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